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The stimulus to this development is quite other than that for the hair-tendrils. The latter, according to the author, have not been discovered heretofore in any seed plant.—C. R. B.

**Phylogeny of the embryo -sac and double fertilization.**—PORSCH<sup>21</sup> attempts to explain the usual eight-nucleate embryo sac of the angiosperms as an extreme reduction from the gymnosperm type, consisting of two reduced archegonia, the egg apparatus and the upper polar nucleus representing one archegonium, and the three antipodals with the lower polar nucleus representing the other. The egg apparatus is regarded as made up of an egg, two neck cells (the synergids), and a ventral canal cell (the upper polar nucleus). The antipodal complex is interpreted in the same way. Then double fertilization might be an attempt to fertilize both archegonia.

While a combination of all the features presented by gymnosperm and angiosperm gametophytes can be arranged in such a sequence, the reviewer does not believe that there is anything phylogenetic in it. Though the angiosperm embryo sac has doubtless come through stages in which there was a tissue with archegonia, we do not believe that any part of the archegonium, except the egg itself, has been retained.—CHARLES J. CHAMBERLAIN.

**Chemotaxis of Lycopodium sperms.**—BRUCHMANN'S discovery that the sperms of *Lycopodium* are sensitive to citric acid and its salts is a disturbing factor in SHIBATA'S generalization that the chemotactic sensitiveness of the three great peridophyte lines toward malic acid approves the theory of their monophyletic origin. Yet BRUCHMANN, apparently not sensing the humor of this idea, gravely softens the blow by suggesting that this aberrant behavior of the *Lycopodium* sperms does not place the lycopods outside this line of descent, but is to be explained by the saprophytic character of the odd gametophyte!<sup>22</sup> He shows that malic acid is not responded to, and that saccharose, glucose, lactose, albumin and other proteins, acetic, oxalic, formic, and butyric acids are likewise ineffective. But to citric acid 1:1,000,000, and to its alkali salts in 1:100,000, the sperms respond positively, the reaction becoming negative at 1:1000 and 1:100 respectively. Acids and alkalies proved repulsive, as in the case of other sperms. The Weber law was found to be valid, with the ratio 1:30-40.—C. R. B.

**Geotropic perception.**—NEWCOMBE, after criticizing again the weakness of the experiments for the localization of geoperception, has used the old decapitation method for demonstrating that in some species as much as 4 or 5<sup>mm</sup> of the root tip is capable of perceiving the gravity stimulus.<sup>23</sup> He is unable to relate the

<sup>21</sup> PORSCH, OTTO, Versuch einer phylogenetischen Erklärung des Embryosackes und der doppelten Befruchtung der Angiospermen. Vortrag gehalten auf der 79. Versammlung deutscher Naturforscher und Aertze in Dresden am 16. Sept. 1907. pp. 1-49. 14 text figures.

<sup>22</sup> BRUCHMANN, H., Von der Chemotaxis der Lycopodium-Spermatozoiden. *Flora* 99:193-202. 1909.

<sup>23</sup> NEWCOMBE, F. W., Gravitation sensitiveness not confined to apex of root. *Beih. Bot. Centralbl.* 24:96-110. *pl. 3. figs. 6.* 1908.